



## Outcome Analysis of the Different Pedicles Used in Therapeutic Mammoplasty after Breast Conservative Surgery

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### Abstract

**Introduction:** Nowadays breast conservative surgery is always more used thanks to screening program that gives the possibility to find tumors earlier and thanks to therapeutic mammoplasty. In therapeutic mammoplasty, the surgical technique depends on the position and the size of the tumor and from the size of the breasts. We can analyze two big groups of techniques for this surgery: The inferior and the superiors (superior, superomedial, superolateral) pedicles. The aim of the study is to compare patients undergoing breast conservative surgery and therapeutic mammoplasty in terms of esthetical result and quality of life.

**Materials and Methods:** This is a retrospective, observational, single-center, non-randomized study, including patients who underwent breast conservative surgery and therapeutic mammoplasty between 2012 and 2020 at Cattinara Hospital in Trieste with a minimum follow-up of 12 months. Patients have been divided into 2 groups: Group A including those with a superior pedicle reconstruction and group B including patients who underwent an inferior pedicle reconstruction. In these oncological patients the choice of the pedicle was determined by the tumor area. For every patient we collect: Anthropometric breast measurements, breast volume, Breast-Q questionnaire, iconographic documentation analyzed by breast surgeons and non-medical observers.

**Results:** Group A included 28 patients and group B 38 patients. Mean age of patients of group A was 57 years old, group B 59, no significant difference was noticed. As for anthropometric measurements, we compared the right measurements with the left measurements and no significant differences have been noticed, neither for breast volume. We analyzed 4 modules of the Breast-Q questionnaire. Even in this case we didn't find any statistically significant difference. Regarding iconographic documentation there were statistically significant differences in shape and global result in favor of group A when pictures were analyzed by plastic surgeons.

**Conclusion:** From our study we didn't find any significant difference regarding quality of life and esthetical result in patients undergoing breast conservative surgery and therapeutic mammoplasty with superior pedicle and inferior pedicle. This means that we can guarantee a good esthetical result and a good quality of life independently from the tumor area that influences the pedicle choice.

**Keywords:** Reconstructive surgery; Outcome analysis; Breast conservative surgery; Therapeutic mammoplasty; Superior pedicle

### Introduction

Nowadays Breast Conserving Surgery (BCS) is more and more used thanks to the programs of screening that allow the identification of early-stage tumors, which are smaller and often easier to treat. Quadrantectomy followed by radiotherapy grants oncological safety demonstrated even in a randomized clinical trial that evaluates the long-term analysis and results after 12 years follow-up, comparing total mastectomy with lumpectomy with or without irradiation in breast cancer treatment [1].

In medium-large breasts, especially if they present an important grade of ptosis, quadrantectomy can be associated to therapeutic mammoplasty.

In therapeutic mammoplasty we use reduction mammoplasty techniques in order to reshape

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breasts after quadrantectomy. This allows an improvement of the aesthetic result and also the possibility of excising bigger cancer and with larger tumor free margins.

In this kind of surgery, the technique depends on the position and the size of the tumor and on the size of the breasts as stated by McCulley [2].

According to the position of the tumor, it is important to decide the type of skin resection, the NAC pedicle and how to fill the empty space left by the quadrantectomy. For this reason, the surgeons must be aware of all the mammoplasty techniques in order to optimize the surgical procedures according to the local clinical condition of every single patient.

This type of surgery leads to a great result and guarantee a high postoperative satisfaction both in terms of aesthetic and patients' improved quality of life.

We can access two big groups of pedicles in therapeutic mammoplasty: The inferior and the superiors (superior, superomedial, superolateral) pedicles. Each type of pedicle has its advantages and disadvantages and every surgical technique has its own indications and contraindications.

The aim of this study is to compare patients undergoing breast conserving surgery and therapeutic mammoplasty with different pedicles in terms of aesthetic result, estimated both in an objective and a subjective way, and quality of life.

## Materials and Methods

This is a retrospective, observational, single-center, non-randomized study, including patients who underwent breast conservative surgery and therapeutic mammoplasty between 2012 and 2020 at Cattinara Hospital in Trieste with a minimum follow-up of 12 months from the surgery time.

We divided the patients into two groups based on the chosen pedicle. The preoperative plan and the skin incisions pattern were decided together with both breast surgeons, that made the excisional part of the surgery, and the plastic surgeons that provide the therapeutic mammoplasty and the contralateral symmetrization of the breasts.

Patients have been divided into 2 groups: Group A including those with a superior pedicle pattern and group B including patients who underwent an inferior pedicle pattern. For every patient we analyzed these data [3]:

- Anthropometric breast measurements
- Breast volume
- Iconographic documentation
- Breast-Q questionnaire

**Anthropometric breast measurements and breast volume:** Measurements were obtained from all the patients involved in the study, comparing the right side with the left side, in particular: Sternal notch-nipple distance, nipple-inframammary fold distance, nipple-medium line distance and breasts projection. In this way we can have objective data to estimate the symmetry between the two breasts of each patient. We call this difference  $\Delta$ : the small the  $\Delta$  is the better it is the result. Then we compare the results of group A with the results of group B.

Breast volume was calculated thanks to these measurements using the Breast-V application [4]. As for the anthropometric breast measures, for breast volume also, we compared right and left side and then the media of group A with the media of group B.

## Iconographic documentation

In order to have a subjective opinion of the aesthetic aspect of the surgery, bidimensional pictures of the patients in 6 projections were taken (frontal picture with arms adducted, frontal with arms abducted over the head, right and left profile and three quarters positions) and ask to 3 plastic surgeons and 3 non-medical observers to give a score to these pictures using Likert scale with scores from 1 (poor result) to 5 (excellent result) considering 3 domains: Shape, symmetry and global result. Observers were blinded to each other when they were giving the score. We compare the medium scores of group A with the medium scores of group B to estimate if there was a significant difference between the two groups and if one pedicle was better than the other (Figure 1, 2).

## Breast-Q questionnaire

We ask all the patients to fill out the Breast-Q questionnaire, BCT module. With this survey [5], we wanted to evaluate the self-satisfaction of the patients. Unfortunately, because of the retrospective nature of the study, we didn't have the possibility to make a comparison before and after the surgery.

Patients were asked to answer all the modules of the BCT Breast-Q questionnaire: Psychosocial well-being, sexual well-being, satisfaction with breasts 1-2, physical well-being: Chest 1-2, adverse effect of radiation, satisfaction with information: Breast surgeons, satisfaction with information: Radiation oncologist, satisfaction with surgeon, satisfaction with medical team, satisfaction with office staff.

For every section of the survey patients were asked to give a score from the lower to the higher according to the different features analyzed. Then with the converting tables given in the BREAST-Q questionnaire we obtained a score from 1 (poor satisfaction) to 100 (optimum satisfaction).

Speaking of features, in our work we investigate only some of the Breast-Q modules that are: psychosocial well-being, sexual well-being, satisfaction with breasts 1-2, physical well-being: Chest 1-2. Other modules weren't part of the purpose of this study.

## Statistical analysis

Data were collected on Microsoft Excel and then examined with SPSS program (IBM). Variables were compared between the two groups using the U Mann-Whitney test. A p-value inferior to 0.05 has been considered statistically significant.

## Results

We analyzed our patients' database in order to extrapolate the one that filled our inclusion criteria that were 82. Then patients were called on the phone for a maximum of three times, after having no answer, patients were excluded from the study. Ten patients didn't answer, six didn't want to participate, 66 answered so they were included in the study.

Group A (patients with superior pedicle reconstruction) includes 28 patients, group B (patients with inferior pedicle reconstruction) includes 38 patients.

Mean age in group A was 57 years old, in group B 59, no



**Figure 1:** Preoperative and postoperative pictures of superior-based therapeutic mammoplasty. A-C preoperative views; D-F postoperative views.



**Figure 2:** Preoperative and postoperative pictures of inferior-based therapeutic mammoplasty. A-C preoperative views; D-F postoperative views.

statistically significant differences were noticed.

The mean weight of the excised tissue of group A was 119 gr and 104 gr for group B, no statistically significant differences have been noticed.

**Anthropometric breast measurements and breast volume assessed were:**

**In group A:** Sternal notch-nipple distance mean was  $\Delta$  0.57; nipple-inframammary fold distance mean was  $\Delta$  0.68; nipple-medium line distance mean was  $\Delta$  0.59; breasts projection mean was  $\Delta$  0.41.

**In group B:** Sternal notch-nipple distance mean was  $\Delta$  0.60; nipple-inframammary fold distance mean was  $\Delta$  0.45; nipple-medium line distance mean was  $\Delta$  0.53; breasts projection mean was  $\Delta$  0.39.

We use U Mann-Whitney test to analyze and compare the measurements mentioned above: Sternal notch-nipple distance,

nipple-inframammary fold distance, nipple-medium line distance and breasts projection. No statistically significant differences were assessed.

Sternal notch-nipple distance p-value was 0.577; nipple-inframammary fold distance p-value was 0.087; nipple-medium line distance p-value was 0.734 and breasts projection p-value was 0.488.

After that, due to the Breast-V application, using the collected information, it was possible to calculate the breast volume. Actually, by inserting sternal notch-nipple distance, inframammary fold-nipple distance, inframammary fold-fold projection distance the application allows us to obtain the estimate volume of the breasts. The mean  $\Delta$  of group A was 34.25, the one of group B was 27.40.

We use U Mann-Whitney test to compare the data of the two groups, no significant differences have been noticed for breast volume as the p-value was 0.113.

## Iconographic documentation

As mentioned above using the Likert scale, the data collected by evaluation of plastic surgeons in group A mean results were: for shape 3.53; for symmetry 3.75; for global result 3.64. About the non-medical observers: Shape 3.64; symmetry 3.36; global result 3.58.

In group B, the data collected by evaluation of plastic surgeons mean results were: for shape 3.02; for symmetry 3.51; for global result 3.23. From the non-medical observers: Shape 3.54; symmetry 3.37; global result 3.56.

U Mann-Whitney test was used to make the comparison and a statistically significant difference was noticed in shape and global result estimated by plastic surgeons' observation and scores that have been higher in group A than group B. P-value was 0.008 for the shape and 0.21 for global result.

## Breast-Q questionnaire

**In group A** these results were collected: psychosocial well-being 73.3/100; sexual well-being 66.9/100; satisfaction with breasts 1 71.4/100; satisfaction with breasts 2 77.3/100; physical well-being: Chest 1 76.4/100; physical well-being: Chest 2 78/100.

**In group B:** Psychosocial well-being 73.8/100; sexual well-being 61.6/100; satisfaction with breasts 1 69.2/100; satisfaction with breasts 2 67.2/100; physical well-being: Chest 1 82/100; physical well-being: Chest 2 86.4/100.

We always used the U Mann-Whitney test to compare the results of the two groups and we didn't find any statistically significant difference.

The p-value assessed were 0.857 for Psychosocial well-being, 0.484 for sexual well-being, 0.562 for satisfaction with breasts 1; 0.634 for satisfaction with breasts 2; 0.287 for physical well-being: Chest 1; 0.130 for physical well-being: Chest 2.

## Discussion

During the past years breast surgery has changed, in terms of surgical technique progression, actually we assisted to an improvement, starting from radical mastectomy, through conservative procedures and when it is feasible breast conserving surgery.

Nowadays more and more patients could benefit from breast conserving surgery, this mainly due to research, studies and innovation procedures.

Indeed, this leads to the fact that in selected patients and with correct oncological resection and indications it is possible to reach an equivalent outcome, in terms of oncological safety and risk of recurrence, both in mastectomies and in conservative surgery followed by radiotherapy [6-9].

It goes without saying that this leads to an improvement in oncoplastic surgery supporting an equipe work between the breast surgeon, that conduces the demolitive part of the surgery, and the plastic surgeon that works on the reconstructive part.

Talking about oncoplastic surgery we can distinguish two types of techniques: Volume replacement (including local flaps, lipofilling) and volume displacement with reduction mammoplasty and mastopexy patterns [10].

Speaking about volume displacement, techniques can be divided in two groups based on the amount of tissue resected: Level I

(donut mastopexy, batwing mastopexy) that have not a real dermo glandular pedicle supporting the NAC, indeed these procedures are used when the amount of tissue resected is less than the 20% of the breast mound and level II (the therapeutic mammoplasty mentioned above where the amount of tissue resected is more than the 20% of the breast mound) that are based on dermoglandular vascular pedicle supporting the NAC. Of course, the use of each pedicle depends on the site of the tumor [11].

In literature we can find many articles that propose reconstructive algorithms with different techniques and different patterns of skin resection [2,12].

All the patients included in this study underwent breast conserving surgery with following therapeutic mammoplasty and they were divided based on the pedicle used during the reconstruction.

For this study we focused on patients who underwent breast conserving surgery and a volume displacement procedure.

Generally, two big groups of pedicles can be identified: The inferior one and the superiors which include the pure superior, the superomedial and the superolateral pedicles.

If we talk about aesthetic reduction mammoplasty, usually the most used technique is the one based on superior pedicles, this founds its explanation in the long term follow up: Indeed, most of the patients are more satisfied because the incidence of ptosis is lower especially if compared to inferior pedicle technique. It is known, indeed, that superior pedicle procedures allow the surgeon to remove the inferior part of the gland that is usually the heaviest. As imagined, one of the most common complications after inferior pedicle procedures is the ptosis of lower quadrants that cannot be removed [13].

This cannot be always applied to oncological patients because, as said earlier, the pedicle used for the therapeutic mammoplasty depends on the position and the size of the tumor and on the size of the breasts.

In our unit all the procedures are performed in one surgical time: Tumor resection, therapeutic mammoplasty and contralateral symmetrization.

The rationale of this choice find explanation in the fact that if the reconstructive part comes after the radiotherapy, it cannot guarantee a good outcome in terms of aesthetic result and even of increased risk of complications. It is well known than managing radio treated tissue is more challenging, there is an increased risk of adiponecrosis, wounds dehiscence, infections, poor scarring outcome, necrosis of the NAC.

Nonetheless in this way patients have to undergo only one surgery and this reduces the risks related to the operation itself and the general anesthesia and reduces the costs for the hospital.

The aim of the study is to see if there is a significant difference of outcome in these two groups of patients and we wanted to do it by analyzing all the possible aspect, from the aesthetic one to the self-satisfaction and the quality of life.

As for the aesthetic part, we can say that a good result can be achieved if breasts are symmetrical, we tried to demonstrate this even if it's quite challenging [3].

In the two groups analyzed we didn't find statistically significant difference in terms of anthropometric measurement and breasts

volume between the two breasts.

Excellent results in terms of symmetry and breast shape can be reached with both the surgical techniques used, which are related to the local clinical stage and to the tumor position and size.

As regards the iconographic evaluation, we find a statistically significant difference in terms of shape and global result in favor of group A when pictures have been shown to plastic surgeons.

This means that according to plastic surgeons, patients who underwent therapeutic mammoplasty with superior pedicles have a better result in terms of shape and global result compared to those who underwent a reconstruction with the inferior pedicle and this is also confirmed by literature that stresses the superiority of superior pedicles in breast reduction mammoplasty and therapeutic mammoplasty in spite of the inferior pedicle.

Anyway, high scores were given by both the plastic surgeons and non-medical observers in all the domains because the aesthetic result was good despite the pedicle used.

Speaking of symmetry, it was not finding a statistically significant difference and this is not surprising because symmetry is not strictly related to the pedicle used, which cannot be said if we consider breast shape and other aesthetic consideration as global results, in fact as mentioned above superior pedicles techniques have better outcomes.

We can see that this difference is smaller in non-medical observers that probably don't focus their attention on the same details noticed by plastic surgeons.

On the other hand, Breast-Q questionnaire is largely used in many scientific studies in order to estimate the self-satisfaction of the patients and their quality of life after breast surgery and it can now be considered the gold standard as suggested by Liu et al. [14] in a systemic review of the literature.

As for our results using the Breast-Q survey, we didn't find any statistically significant difference, this means that both groups of patients undergoing therapeutic mammoplasty with superior and inferior pedicle are satisfied in terms of aesthetical result and quality of life.

One of the limits of this study is the numerosness of the sample, that is quite small, by improving it we could obtain different results. Another limit, as stated above, is the retrospectivity of the study. Doing a prospective study, it could be possible to analyze patients before and after surgeries, and see if therapeutic mammoplasty is able to improve also the aesthetic outcome after the procedure, considering that this kind of surgery has the same skin incision patterns as a reduction mammoplasty, as suggested by McCulley (McCulley & Macmillan, 2005). This could be true especially in those patients with large breasts that would find in therapeutic mammoplasty also an important reduction of the breast.

## Conclusion

From our study any significant difference was found regarding quality of life and aesthetic result in patients undergoing breast conservative surgery and therapeutic mammoplasty with superior pedicle and inferior pedicle.

This means that a good esthetic outcome and a good quality of life can be reached regardless of the amount of breast tissue removed because of the tumor and the tumor location that influences the pedicle choice.

Anyway, it is well established that superior pedicle techniques usually guarantees better aesthetic outcomes in terms of breast shape and position, so when it is possible it should be privileged.

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